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Monitoring changes in transit service quality over time

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Abstract

Measuring and monitoring quality of supplied services is fundamental for guaranteeing to the users of the services good levels of quality and a continuous improvement of the service characteristics. Many researchers consider the customer's point of view as the most relevant for evaluating transit service quality, being the customers the real users of the service. For this reason, service quality has been generally evaluated based on customer perceptions and expectations about the service, collected through the well-known Customer Satisfaction Surveys. In this work, just the issue of measuring service quality by analysing users' opinions is approached. Specifically, data from Customer Satisfaction Surveys conducted by the Transport Consortium of Granada (Spain) over the years (from 2006 to 2012) are analysed, and the main changes produced in transit service over time are monitored by different ways, identifying deteriorating conditions and highlighting improvements in service in response to service intervention aspects.

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Keywords: Public transport; Service Quality; Monitoring; SERVPERF.

1. Introduction

Travel behaviour has become more complex because the traditional journeys, from home to places of work or study, have been replaced by trip chains. These new characteristics of demand have led to widespread use of the private car (Eboli and Mazzulla, 2012a). Transit is often argued as a promising travel mode to reduce dependence on automobile, thereby lessening traffic congestion, alleviating environmental pollution, and so on (Nocera, 2011). Transportation contributes 26% to the overall CO2 emissions, thus constituting the second biggest polluter in the EU (Nocera and Cavallaro 2011, 2012). Implementing policies and procedures designed to improve the quality of public transport (PT) services holds a great priority for transit agencies and transport planners, who, in order to promote a more sustainable mobility in cities, seek to encourage modal shift from private vehicles to PT

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services, by offering high quality services which lead to higher customer satisfaction. Most transport agencies did not begin to focus on the customer until the 1990s, and, even now, smaller agencies may be faced with budget and resource constraints and cannot give priority to customer satisfaction and service quality issues (TRB, 2002). However, according to the Handbook for Measuring Customer Satisfaction and Service Quality (HMSCCQ) (TRB, 1999), an increase in customer satisfaction translates into retained markets, increased use of the system, newly attracted customers, and a more positive public image.

In order to ensure continuous improvement of the delivered transit services, performance measures are an essential tool for focusing transit agencies on their strategic goals (Eboli and Mazzulla, 2012b). By periodic and regular data, updating it is possible to monitor the status and evolution of an analyzed concept, and as Crocco et al. (2011) stated, it allows to evaluate the effect of policies and to introduce specific interventions. So, measuring and monitoring quality of supplied services becomes fundamental for formulating adequate transport strategies. It helps to determine if the goals established by the operators are being met or are being exceeded, and also for ascertaining the trend of the service. Moreover, transport agencies can determine the effect of a specific intervention in the service by analysing the existing quality before and after this change. Many authors consider that service quality should be measured from the customer's perspective, since passengers are the real users of the service. Therefore, service quality can be measured by capturing passengers' perceptions of the attributes describing the service. These perceptions are usually collected through Customer Satisfaction Surveys, which are yearly or half-yearly carried out by the transport operators. The information collected in the surveys establish the basis for the monitoring process.

There are two different ways of monitoring service quality in public transportation: 1) by individual measures of the attributes describing the service or 2) by aggregated indexes expressing the overall service quality. Carrying out both approaches together is the ideal, because individual analyses help to set priorities for service improvements (they help managers to choose from among a long list of service attributes to more optimally focus their organization's attention and resources (Weinstein, 2000)), while the aggregated indexes allow service to be analyzed over time and different services to be compared (e.g. territorial scope, suppliers, etc). When only an aggregated analysis is developed, the presentation is simple and with a minimum number of reported measures; however, significant changes in their individual components may be masked. As an example, one attribute of the service could substantially improve while at the same time another attribute declines greatly, resulting in a minimal change of the overall index.

All of these measures (individual and aggregated) focus on measuring service quality based on assessments of the users about the service. These assessments can take the form of expectations, perceptions, importance, or satisfactions rates.

Some of the most popular measures used for individually analyzing the quality of the service characteristics are the Zone of Tolerance, proposed by Parasuraman et al. (1991), and the Importance Performance Analysis, defined by Martilla and James (1997). Parasuraman et al. (1991) thought that passengers' expectations could be divided into two levels, the desired service and the adequate service, and the difference between these two concepts created the Zone of Tolerance. Depending on where the passengers' performance perceptions are located, managers could know where they should act. The Importance Performance Analysis is a quadrant chart which x-axis represents the performance of the attributes, and the y-axis represents the importance of the attributes. By observing the position of each attribute in the four-quadrant chart, managers can determine on which attributes they should focus and the urgency of the intervention.

On the other hand, a wide variety of service quality indicators have been proposed in the literature, such as the SERVQUAL model (Parasuraman et al., 1985), the SERVPERF model (Cronin and Taylor, 1992), the Customer Satisfaction Index, CSI (Hill et al., 2003), the Heterogeneous Customer Satisfaction Index, HCSI (Eboli and Mazzulla, 2009) and so on. The SERVQUAL is the most popular and widely applied technique among researchers (Abdlla et al.2007, Chau and Kao, 2009; Sultan and Simpson, 2000). It considers that service quality index is calculated as a function of the differences between passengers' expectations and perceptions about the

attributes describing the service. Some adaptations of this model have been applied by various researchers, such as the weight SERVQUAL (Pakdil and Aydin, 2007) or the fuzzy weighted SERVQUAL (Chou et al. 2011). Cronin and Taylor (1992) criticized the measurement of service quality through the gap model (SERVQUAL model), and proposed to measure the overall service quality by the performance perceptions only, developing the SERVPERF model. Sánchez et al. (2007) adapted this scale and proposed a weight SERVPERF for assessing the local bus service in Almería (Spain). The CSI is described in Hill et al. (2003) as a measure of service quality on the basis of the attributes' importance and satisfaction rates. The HCSI was introduced by Eboli and Mazzulla (2009) as an improvement of the original CSI. The HCSI takes the heterogeneity of the passengers' opinions into consideration, by giving more significance to the attributes characterized by more homogeneous user judgments, and less significance to more heterogeneous judgments.

Other more complex indices have been used by researchers and academics in the last years, such as Regression analysis (Kim and Lee, 2011; Weinstein, 2000), Structural Equation Models (Andreassen, 1995; Eboli and Mazzulla, 2007, 2012c; Irfan et al., 2011; Karlaftis et al., 2001; Ngatia et al., 2010; Stuart et al., 2000) or discrete choice models (Eboli and Mazzulla, 2008, 2010, 2011; Hensher, 2001; Hensher and Prioni, 2002; Hensher et al. 2003; Marcucci and Gatta, 2007). The main advantage of using more advanced approaches for analysing service quality in public transportation is the possibility of extracting the derived importance of the attributes describing the service. These derived importance methods determinate the importance of the attributes by statistically testing the strength of the relationship of individual attributes with overall satisfaction. They are preferred by researchers and academics because of their numerous advantages (Weinstein, 2000), however, asking customers to rate each attribute on an importance scale is still the mostly used method, especially by the operating companies. Then, in spite of the numerous benefits of these more complex indices, they are sometimes not very intuitive. For this reason, transport planners and operators need tools that facilitate them to interpret and understand the results. Traditional indices (SERVQUAL, SERVPERF, etc) are still the most comprehensive and widespread methods for measuring and monitoring transit service quality.

Therefore, the main purpose of this study is to measure and monitor the quality of bus services of the metropolitan area of Granada (Spain) by different ways (with individual measures of the attributes describing the service and with an overall service quality index), in order to identify changes in the performance of the service across the years (from 2006 to 2012) and to discover deteriorating conditions or improvements on the service.

Then, after this introduction, the experimental context of this research work is introduced in the second section, which shows the structure of the surveys, a brief description about the characteristics of the sample, and the methodology used for monitoring service quality across the years. The third section is about the results obtained in the monitoring process, and finally a brief general conclusive discussion of the work is proposed in the fourth section.

2. Experimental context

2.1. Data

The transit service analysed in this research work corresponds to the metropolitan PT service of the city of Granada (Spain). Granada is a medium-sized city in the southern Spain with a population of 523,845 in the metropolitan area. A Granada Area Transport Consortium was created in 2003 to coordinate bus service management in the Metropolitan Area. The PT service in the metropolitan area carries more than 10 million passengers every year. It is provided by a bus system in which 15 bus companies operate in 18 independent transport corridors linking the metropolitan municipalities with the centre of the city of Granada.

The line network is established by a radial structure focused on two central areas of the city of Granada, one in the north and the other one in the south of the city, and extending in all directions (corridors) to the rest of the urban agglomeration. Owing to the fact that Granada municipality population represents almost half of the total

population in the metropolitan area, and also the main trip generators centres are located there (such as administrative centres, health centres, educational and commercial centres), the structure of the transport system has been generated with this shape.

Since 2003, various improvements have been implemented by the Transport Consortium in the metropolitan transport system. These improvements involve establishing an Integrated Fare System, increasing the number of service a day, creating new services in areas of urban growth, etc. Moreover, in 2006, the Transport Consortium conducted the first CSS to evaluate Service Quality in the Granada Metropolitan Public Transport system. Since this year, an annual CSS has developed to analyse changes in the perceived Service Quality of the passengers. More than a thousand users are interviewed in the months of March or April every year. The interviews are conducted through a face-to-face questionnaire proposed to the users at the main bus stops of the lines. It would be interesting to extend the interviews to non-users of the PT service, in order to discover, not only the opinions of the current passengers about the level of quality provided, but also how non-users perceive the image of it.

The questionnaires were structured into two main sections. The first section gathered general information about the service (e.g. operator, line, time of the interview, origin destination), demographic characteristics of the users (e.g. sex, age, occupation) and their travel habits (e.g. reason for travelling, frequency of use, type of ticket, availability of a private vehicle, complementary modes used for access to/moves from the bus stop). The second section of the questionnaire focuses on the users' opinions about the service. This part is also divided in 3 main sub-parts: Part A, according to which passengers were asked to state or rank the importance of the attributes describing the service (this part have changed across the years), Part B, referred to the perceptions about the quality of each of these attributes, and Part C, collecting a global evaluation of the service quality.

The attributes used for knowing users' opinions about the service are the following: frequency and punctuality, speed of the trip, proximity of the stops to/from the origin/destination, fare of the ticket, cleanliness of the vehicle, space in the vehicle, temperature in the vehicle, available information, safety on board, courtesy or kindness of the personnel, easiness to get on/off the bus and timetable of the service.

Table 1. Sample Characteristics (CSSs for the period among 2006 and 2012)

Characteristics		**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
Gender	Male	28.48%	33.63%	28.19%	30.18%	28.93%	37.39%	37.89%
	Female	71.52%	66.37%	71.81%	69.82%	71.07%	62.61%	62.11%
Age	{ 18-30 Years Old}	54.39%	56.15%	51.21%	38.90%	56.09%	41.37%	44.82%
	{ 31-60 Years Old}	38.14%	34.28%	38.95%	50.68%	33.91%	45.61%	44.22%
	{ > 60 Years Old}	7.47%	9.57%	9.84%	10.41%	10.00%	13.02%	10.95%
Frequency of Use	Almost Daily	66.67%	67.98%	53.38%	48.11%	51.27%	58.38%	54.57%
	Frequently	20.51%	20.58%	21.80%	20.44%	21.62%	22.34%	23.42%
	Occasionally	11.52%	8.94%	14.13%	19.50%	15.43%	13.10%	13.77%
	Sporadic	1.31%	2.49%	10.70%	11.95%	11.68%	6.19%	8.24%
Travel Reason	Work	28.99%	26.19%	29.68%	24.08%	27.80%	28.48%	26.83%
	Study	34.14%	19.62%	22.03%	22.07%	23.55%	22.89%	27.54%
	Other	36.87%	54.20%	48.29%	53.85%	48.65%	48.63%	45.63%
Mode from origin to the bus stop	Walking	73.16%	78.33%	67.61%	85.43%	70.61%	79.17%	77.72%
	Vehicle	26.84%	21.67%	32.39%	14.57%	29.39%	20.83%	22.28%
Type of Ticket	Standard Ticket	33.06%	41.52%	40.22%	27.42%	22.83%	14.93%	16.88%
	Consortium Card	60.28%	48.18%	52.68%	64.35%	64.63%	73.06%	73.87%
	Senior Citizen Pass	6.25%	6.57%	6.59%	4.03%	6.63%	9.69%	8.34%
	Other	0.40%	3.74%	0.51%	4.19%	5.91%	2.32%	0.90%

The characterization of the sample across the years is represented in Table 1. In general, the samples are characterized by a higher number of females than males. Users aged between 18 and 30 years old and between 31 and 60 years old compose around a 90% of the sample, and only the remaining 10% is older than 60 years old. More than a half use the service almost daily (4 or more times in a week), and about a fifth of the sample takes

the bus frequently (from 1 to 3 times a week). The rest of the respondents use the bus with an occasional or sporadic frequency (more or less than once a month). Concerning the purpose of the trip, passengers have different reasons for travelling. For about half of the respondents the main reason is reaching the work or study place. The other half stated that they travel for other purposes, such as going to the doctor, shopping, holidays or other personal activities. Most of the sample accesses to the bus stop on foot, and the rest uses other modes (e.g. car, urban bus, motorbike, bicycle, etc). Also information about the type of ticket used by the passengers was collected. Most part of passengers uses the Consortium card, another important group of users travels with the Standard ticket, and only a little part of the sample uses the Senior citizen pass or another type of ticket.

Although little differences were observed in the characterization of the sample over the years, the main changes noticed are: 1) the number of males using the service has grown in the last two years (2011 and 2012); 2) passengers of middle age are also taking more the bus in the last years. In 2011 and 2012, passengers aged between 18 and 30 and between 31 and 60 are equally spread, while years before young people (between 18 and 30) represented more than a half; 3) there is a high increase of the use of the Consortium card, being the Standard ticket less used every year.

2.2. Methodology

The monitoring of service quality over the years can be developed by two different ways: by monitoring the overall service quality as an aggregated and unique quality index (Service Quality Index, SQI), or studying it by individual analyses of the attributes describing the service. In this paper, both approaches have been developed in order to measure the overall level of quality of the metropolitan transit service of Granada over the years (from 2006 to 2012), and also to monitor the main changes produced in the performance of the attributes defining the service. These analyses are restricted to the data collected in the surveys. It was described before that the measures and indexes used for evaluating service quality consider the assessments of the users collected by the surveys in terms of perceptions, expectations, and importance or satisfaction rates. The CSSs analysed in this research work only gathered users' opinions in terms of perceptions and importance rates. However, the way of collecting the rates of importance in the surveys changed several times in the period of time under study (from a 5-point scale, to a 11-point scale, to a ranking in which only the three most important attributes were marked, etc), making very difficult to use them for monitoring the quality of the service over the years. Therefore, the following analyses have been developed:

1) Analysis of the trend of the overall service quality stated by the passengers.

2) Calculation of a Service Quality Index from the passengers' perceptions about the attributes describing the service. The SERVPERF model developed by Cronin and Taylor (1992) has been applied because only the perceptions about the attributes describing the service were available for all the years under study. Therefore, the overall service quality is evaluated according to:

$$SQ = \sum_{j=1}^{k} P_{ij} \qquad (1)$$

where k is the number of attributes, and P_{ij} is the performance perception of the passenger i with respect to the attribute j.

3) Analysis of the trend of the passengers' perceptions about the quality of the attributes describing the service, identifying deteriorating conditions and highlighting improvements in the service.

3. Results

3.1. Trend of the Overall Evaluation stated by the passengers.

By analysing the average rates stated by the passengers across the years (Table 2), we can observe a growing tendency along the time, but with punctual falls in some specific points of the period of time under study. The growing tendency in the passengers' evaluation of the overall service quality demonstrates that service operators and managers are formulating adequate transport strategies and policies for achieving an on-going enhancement on the quality of the service provided to their users. Nevertheless, some efforts should be done in order to identify and solve the deficiencies perceived by the passengers when the overall service quality fell down, and also in order to continuously improve the performance of the service towards to a higher level of quality (there is always room for increasing customer satisfaction).

In 2006 passengers were not satisfied with the service provided, expressing an average rate of 2.45 in a 5-point scale. This could be explained given that: 1) it was the first time that a CSS was developed and passengers could have used it as a way of complaint towards the service. In fact, the perception of the attributes describing the service was better and passengers seemed satisfied in almost all of them; and 2) in 2006, the consortium had still done little interventions with the service for enhancing its quality (services characterized by low frequency, little information, bad punctuality, etc).

In 2007 passengers' perception about the service was much better, with an increase of more than one point in the average rate (from 2.45 to 3.52). However, in 2008, their satisfaction with the service went slightly down, as happened in 2012 with respect to the growing tendency pointed out before. The fall produced in 2008 is understandable given the construction of the metro started in April of 2007 (still not finished) causing some disturbances in the ordinary performance of the service (e.g. frequency, timetable, itinerary, etc). The decrease in the perceived level of quality in 2012 could be due to the main interventions made by the transport consortium of Granada for improving the quality of the service, developed in the time period between 2003 and 2011 (and little interventions were made later) or maybe because passengers have become more critics with the service over the time. However, without a disaggregated analysis of the service it is very difficult to discover the real reasons. The highest score was reached in 2011 with an overall service quality of 3.73.

Table 2. Passengers' stated overall service quality across the years (from 2006 to 2012)

Year	Average rate	Standard Deviation	Valid Records	Average rate Recoded*
2006	2.45	0.96	1068	3.63
2007	3.52	0.84	1192	6.29
2008	3.44	0.85	1279	6.11
2009	3.59	0.78	1275	6.48
2010	3.58	0.79	1278	6.45
2011	3.73	0.66	1603	6.84
2012	3.65	0.77	1693	6.62

*Recodification performed into a 11-point scale

3.2. A Service Quality Index. The SERVPERF model.

Table 3 shows the average rates and the standard deviations of the perceptions scores stated by the passengers about the attributes describing the service, and the SQI calculated through the SERVPERF model. According to the values of the SQI, they also showed a growing tendency in the perceived level of quality, but with little falls in 2008 and 2012.

Table 3. Calculated service quality index (SQI). SERVPERF model

		Average perceptions of the service quality attributes						
Attributes	**Statistic**	**2006***	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
Easiness recharging	*Average rate*	7.08						
	Std.Deviat.	2.72						
Fare	*Average rate*	6.33	6.06	5.84	5.98	6.43	6.37	5.02
	Std.Deviat.	2.25	2.60	2.49	2.18	2.28	2.43	2.57
Information	*Average rate*	6.03	6.62	5.97	6.22	6.72	6.73	6.77
	Std.Deviat.	2.47	2.46	2.46	2.30	2.57	2.07	2.13
Courtesy	*Average rate*	7.30	7.94	7.70	7.92	7.95	7.98	8.12
	Std.Deviat.	1.52	1.82	2.07	1.73	1.94	1.74	1.61
Safety	*Average rate*	7.22	7.65	7.48	7.41	7.66	7.70	7.68
	Std.Deviat.	1.47	1.99	2.02	1.89	1.95	1.75	1.64
Accesibility	*Average rate*	6.66	6.75	6.99	7.12	7.46	7.39	7.17
	Std.Deviat.	1.95	2.48	2.32	1.82	1.94	1.90	1.95
Cleanliness	*Average rate*	6.86	7.43	7.28	7.23	7.71	7.66	7.24
	Std.Deviat.	1.60	1.83	1.98	1.76	1.72	1.56	1.70
Space	*Average rate*	6.12	7.14	6.54	7.00	7.46	7.39	7.02
	Std.Deviat.	2.05	2.04	2.27	1.92	1.92	1.83	1.91
Temperature	*Average rate*	6.73	7.37	6.83	7.20	7.63	7.68	7.22
	Std.Deviat.	1.82	1.97	2.07	1.70	1.82	1.60	1.96
Proximity	*Average rate*	6.86	7.34	6.93	6.89	7.08	7.21	7.22
	Std.Deviat.	2.17	2.21	2.45	2.07	2.35	2.07	2.05
Speed	*Average rate*	6.57	7.23	6.62	6.73	7.19	7.20	7.19
	Std.Deviat.	1.97	1.98	2.10	1.94	1.96	2.16	1.87
Punctuality	*Average rate*	5.97	7.28	6.69	6.81	7.71	7.73	7.55
	Std.Deviat.	2.70	2.33	2.35	2.06	1.95	1.84	1.64
Frequency	*Average*	4.99	6.80	5.65	6.07	6.37	6.46	6.13
	Std.Deviat.	2.90	2.56	2.85	2.42	2.52	2.19	2.36
TimeTable	*Average rate*				6.37	6.30	6.43	6.26
	Std.Deviat.				2.44	2.64	2.33	2.38
SQI	*Average rate*	**6.52**	**7.13**	**6.71**	**6.84**	**7.21**	**7.23**	**6.97**

*In 2006 the Average rate and Standard deviation is recoded from a 5-point scale to a 11-point scale

By comparing the overall service quality stated by the passengers with the service quality measured through the SERVPERF index, the stated opinions of the passengers for each year were worse than the SQI calculated with their perceptions about the attributes describing the service (Figure 1). It could be due to the fact that passengers are asked to declare their perceptions about the global performance of the service before judging the different attributes describing the service. It has been proved in de Oña et al. (2012) who found in their research work that passengers changed their evaluation about the service before and after they reflected on the attributes that defined it. They also discovered that passengers' evaluation about service quality before their reflection was lower than their evaluation stated later.

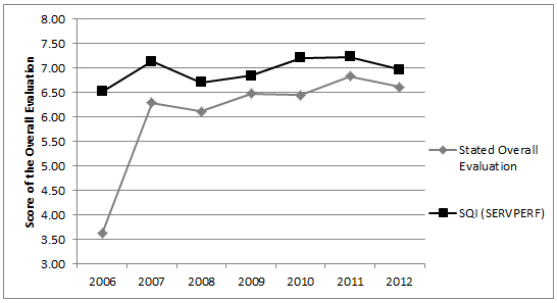

Fig. 1. Stated overall evaluation vs. Calculated SQI (SERVPERF)

3.3. Trend of the service quality of the attributes

In general, passengers were very satisfied with the attributes Courtesy and Safety across all the years (Table 4), with values of their perceptions ranging between 7.22 and 8.12, and presenting little dispersion among users (standard deviation < 2.07, showing homogeneous opinions). Also Accessibility, Cleanliness, Temperature, Proximity and Speed achieved well assessments by the users, with values over 6.5. However, in this case, only Cleanliness and Temperature show little dispersion (standard deviation < 2.07). On the contrary, passengers were more dissatisfied with Fare, Frequency and Timetable (perceptions under 6.5 in almost all the years), coinciding also with the characteristics with highest dispersion (standard deviation ranging from 2.18 to 2.90).

Nevertheless, passengers' evaluation of the attributes defining the service change across the years. All of them, except Accessibility, showed a fall in the average value of the perceptions in 2008 with respect to the year before. It justifies the poorer overall evaluation of the service this year, and also it demonstrates that something was happening in this period of time. It could be explained by the construction of the metro as it was pointed out before. The attribute Accessibility had a growing tendency from 2006 to 2010. In these years, the transport consortium of Granada started to increase the number of vehicles that were adapted to low mobility people. However, since 2011, the number of new vehicles adapted and the perceptions of Accessibility went slightly down, and in 2012, only 39% of the vehicles were adapted to low mobility people. Passengers' satisfaction with this attribute is still high (>7), but it is demonstrated that passengers expect more about this aspect of the service.

Regarding Fare, the main significant change produced in its average perception score was in 2012, when its evaluation falls down to 5.02 in contrast to the values stated in the previous years (ranging from 5.84 to 6.43). In fact, since 2008, passengers' satisfaction with this attribute achieved an on-going improvement across the years However, since 2011, passengers' satisfaction with this attribute started to decrease, maybe owing to the various rises carried out in the price of the ticket in the last period (in July of 2010, April 2011 and January 2012, with a mean rise of 11.5% in the standard ticket and 8% in the consortium card). This has produced a great shift in the type of ticket used by the passengers in the last years (2011 and 2012), ceasing the use of the standard ticket in favour of the consortium card (Table 1). This last rise of the price has generated a high dissatisfaction to the users.

Cleanliness, Space, Temperature, Punctuality, Frequency and Timetable also achieved a lower satisfaction value in 2012 compared to the value stated in 2011. No evident reasons are found for this decrease in passengers' satisfaction. It only could be explained given that the transport consortium of Granada has carried out less interventions since 2011, and passengers were expected more about the service. In addition, they could be becoming more demanding with the quality of the service every year.

However, the suppliers of the service should develop an in-depth research for discovering which are the real reasons for which passengers are more dissatisfied with the service in this last year, in order to formulate adequate strategies solving this problem and allowing the quality in the following years to be improved.

On the other hand, Information, Courtesy, Safety, Proximity and Speed showed better performance in the last years, and also in 2012. The Transport Consortium of Granada is continuously trying to improve these characteristics, for example, installing new informative panels (that provide passengers the real time of the bus arrival) in the main bus stops of the service, motivating the staff (i.e. bus drivers) for developing a more careful driving and a more kind treatment to passengers, and so on.

4. Conclusions

Measuring and monitoring service quality in public transportation is an important issue for transport managers and suppliers, who, based on different analysis, could identify changes in the quality of the service provided over the time and also discover the main effects that the interventions developed in the service have produced on passengers' satisfaction.

The data collected through the CSSs can be treated by two different ways, as a global measurement, or by individual analysis of the attributes describing the service. Each of these approaches provides useful information separately, but when they are used jointly, its informative power is much higher. The outcomes extracted by these analysis bring very powerful information for formulating adequate transport strategies and achieving an on-going enhancement of the quality of the service focused on the passengers.

The data from the transit service of the metropolitan area of Granada were studied in this paper and interesting findings can be highlighted. The overall service quality stated by the passengers across the years had a growing trend over the time, with two specific falls on the passengers' satisfaction: one in 2008 and the other one in 2012. The reasons for the decrease of passengers' satisfaction in these two time periods could not be identified until the individual performance of the attributes is studied.

Likewise, the calculated Service Quality Index shows a growing tendency in the Overall service quality across the years, and also with little falls in 2008 and 2012. Moreover, this calculated overall score is higher than the score stated by the passengers, due to the fact that when passengers are asked to declare their perceptions about the global performance of the service, it is before they have reflected about the attributes describing the service, and as it was demonstrated in de Oña el al. (2012), in this moment their perception is worse than later.

According to the individual analysis of the attributes also revealing results were found. For example, almost all the attributes show a growing tendency across the years, but with lower average values of the perceptions scores in 2008 and 2012 (as happened with the stated overall evaluation and the calculated service quality index). In general, passengers are more dissatisfied with Fare, Frequency and Timetable (with values under 6.5 in almost all the years), and most satisfied with Courtesy and Safety (with values over 7). One of the most important changes produced in the perceptions of the attributes was for Fare, which fell down more than one point in the last year. Service suppliers should focused on discovering the reasons for which Cleanliness, Space, Temperature, Punctuality, Frequency and Timetable were evaluated as poorer in the last year, in order to solve the possible problems.

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